REMARKS

At the outset, Applicants' representative wishes to thank the Examiner for the courtesies extended during the interview conducted on November 17, 2005. In the interview, the Examiner indicated that claims 3-9 are allowable as Modavis fails to teach or suggest the limitations contained in claims 3-9 and also indicated that the ultimate allowability of the claims is dependent upon an updated search. Also, the Examiner indicated that a Supplemental After Final Amendment would be entered if it advances the case towards allowance. In order to expedite prosecution, Applicants have cancelled claim 1 without prejudice or disclaimer to the subject matter contained therein. In addition, Applicants have amended claim 4 to remove its dependence from claim 1. Accordingly, claims 3-9 are currently pending and are deemed to be in condition for allowance.

Claims Rejection 35 U.S.C. § 103

Referring now to the Final Official Action and particularly pages 2-11 thereof, claims 1 and 3-9 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 5,455,879 issued to Modavis, et *al.* ("Modavis"). Applicants respectfully traverse this rejection for at least the following reasons.

Claim 1 is now cancelled and the rejection with regard to claim 1 is rendered moot. Claim 3 is allowable as it recites, *inter alia*,

> wherein the tip of the optical fiber microlens is processed as a curved surface, in which the intersection of the curved surface with each of two perpendicular planes that contain the central axis of the core is an arc, each with a specified radius.

None of the references either singly or in combination teaches or suggest at least these features.

More particularly, the invention relates to forming curvature surfaces having different radii of curvature which intersect at right angles to one another. The anamorphic lens design illustrated in Figs. 8 and 9 of Modavis is significantly different from that of the present invention. Modavis discloses that the core of the fiber is formed in an ellipse, tapered edge and consists of two planes, and the tapered wedge is crossed at the center of the core forming one ridge line. Furthermore, Modavis goes on to disclose that the factor having a high

coupling is the shape of the ellipsed core and the ridge line is aligned to the major axis of the ellipsed core.

In order to cure the deficiencies of Modavis, the Examiner asserts that Modavis may be interpreted as disclosing, "an elliptically shaped anamorphic lens is formed having inclined surfaces that intersect in a wedge shape, and the tip is further formed into curved surfaces by grinding the surfaces non-linearly (curved) with respect to azimuthal angle ρ, equivalent to the tips formed, as recited in claims 1 and 3." (Office Action at 9.) However, the Examiner fails to show where these alleged teachings may be found in Modavis.

In contrast to these assertions, Modavis expressly discloses at col. 4, ll. 35-46, the following:

> [i]n the anamorphic lens design of FIGS. 5, 6 and 7, lens means 16 consists of a quasi cone-shaped lens wherein the cone angle changes from θ_1 to θ_2 as the as the azimuthal angle ρ changes from 0° to 90°. The cone angle changes back from θ_2 to θ_1 as the azimuthal angle ρ is changed from 90° to 180°. A similar cone angle change occurs at values of azimuthal angle ρ between 180° and 360°. The change in cone angle can be linear or non-linear with respect to the azimuthal angle. Lens 41 differs from typical cone-shaped rotationally symmetric fiber lenses wherein the cone angle θ is the same for all azimuthal angles. (emphasis added.)

As shown from the foregoing, Modavis fails to teach or suggest, "the curved surface with each of two perpendicular planes that contain the central axis of the core is an arc, each with a specified radius" as required by claim 3. Rather, Modavis is directed towards a quasi cone-shaped lens.

Claim 9 is allowable as it recites, *inter alia*,

> the light beam that enters from a given light source forms an elliptical flat shape on the plane that is in contact with the tip of the optical fiber, the optical fiber is positioned by rotating the axis so that the central axis of the core matches the direction of travel of the centerline of the light beam, and a line tangent to the largest curvature in the core tip is perpendicular to the long direction of the elliptical flat shape.

None of the references either singly or in combination teach or suggest at least these features. Again, the Examiner admits Modavis fails to expressly teach the claim features, and relies upon an unsupported interpretation by stating, "the examiner has interpreted from Modavis

(879) references above, that the elliptical shaped microlens 54 is first oriented with the shape of the laser beam to maximize their coupling efficiency, in a manner equivalent to the recited in claim 9." This interpretation is simply unsupported by Modavis.

Rather, Modavis discloses at col. 5, ll. 29-46, the following:

> FIG. 10 schematically illustrates a system for coupling light from laser diode 72 to circularly symmetric single-mode field fiber 74. Source 72 emits a beam of light having an elliptical cross-section, the cross-section of the beam in a plane perpendicular to the beam axis being an ellipse having a major and a minor axis. The elliptical mode fiber (and thus the wedge-shaped microlens) is oriented with respect to the source such that light from source 72 is efficiently coupled to elliptical core fiber 51. Light propagating in elliptical mode fiber 73 can be efficiently coupled to circularly symmetric single-mode fiber 74. For example, light from fiber 51 can be adiabatically transferred to fiber 74 by employing low loss coupling means 75 such as a fusion splice formed by multiple arcing or by using a 1X1 multiclad coupler such as that disclosed in the publication K. P. Jedrzejewski et al. "Tapered-Beam Expander for Single-Mode Optical Fiber Gap Devices", Electronics Letters, 16th Jan. 1986, vol. 22, No. 2, pp. 105-106.

As shown from the foregoing, there is no teaching or suggestion of the recited features of claim 9, which was acknowledged by the Examiner during the interview. More particularly, Modavis discloses that the mode field shape is modified from ellipse to a circle in the ellipse fiber core to use a coupling, and introduces a standard circle fiber core by special melting splice. Clearly, the Modavis neither discloses nor remotely suggests that which is presently set forth in the method set forth in independent claim 9.

It is noted that the beam emitted from the laser diode is transmitted to the end surface of the fiber and it makes a significant difference as to whether or not the end surface of the fiber is flat or curved. It is known that the beam is transferred through a tilt angled border plane, refracted in subsequently condensed again, and an aberration is carried out on the condensed beam. If the diameter of the core is large and is focused in a numerical aperture (NA), the difference of coupling tilt angle is not carried out. However, if the diameter of the core is small such as two to three microns condensing with high coupling is not theatrically expected without a radius of curvature. That is, with previous devices it is in the range of the NA of the fiber effect carried out is substantially equal to the radius of curvature exists

however, under extreme conditions, the effect of the present invention will be achieved.

For at least the foregoing reasons, it is respectfully submitted that Applicants' claimed invention as set forth in independent claims 3 and 9 as well as those claims which depend therefrom are distinguishable over the teachings of Modavis and are proper condition for allowance.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Respectfully submitted,

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